

Observations on the Cutaneous Exudation of the *Triton cristatus*,  
or Great Water-Newt. By Miss ELEANOR A. ORMEROD.

[Read June 6, 1872.]

My attention having been drawn by occasional experiment during some years to the exudation of a viscid fluid accompanied by a strong poppy-like smell from the cutaneous pores of the Common Toad and the Great Water-Newt when under the influence of chloroform vapour, I was induced to examine more particularly into the phenomena connected with this exudation and its effects as shown by the latter (the *Triton cristatus*, or Great Water-Newt), so common in our ponds and ditches. The few notes I offer are from observation of the reptiles in the spring, when in their fullest vigour.

In their natural state, and when undisturbed, the Tritons appear to be scentless; but on being alarmed or irritated, they emit an odour strongly resembling that of bruised poppy-heads, clearly perceptible in the open air, and sufficiently powerful to attract the attention of a person coming into a room in which they are being experimented on, the smell remaining for a considerable time on a hand which has been in contact with the irritated reptile. This scent appears to be given off equally by the Tritons at all stages of growth, from the smallest I have examined, which were about a sixth of the size of the full-grown reptile, to the adult male and female, the only case in which it was not plainly perceptible being that of a female so enormously distended by fluid as to be almost unable to move.

When kept in captivity and much disturbed, the scent and the disposition to give it off, save under great irritation, appear soon to decrease; but in partially dried specimens, such as one that may have escaped from the water and have harboured in a dry room till nearly dead, the poppy-like smell is exceedingly powerful and pungent.

On placing about fifteen or twenty of the Tritons, immediately after taking them from the water, under the influence of chloroform vapour, I found that a viscid liquid was exuded from the pores of the skin, collecting over the wet surface of the animal after death in a kind of slime—this slime forming a sticky deposit on the fingers touching the reptiles; and hardening as a kind of opaque and thick varnish, but not causing pain where the skin of the hand was uninjured, though trifling injuries existing or made

whilst the fingers were still covered with the exuded matter became temporarily acutely painful.

On scraping the coagulated exudation away after the death of the Triton, a further supply of the acrid fluid emitted from the pores may be obtained in a dilute state by placing the animal in distilled water and gently pressing the tuberculated parts of the skin with the finger.

This infusion has a poppy-like smell and peculiar feel, rather than taste, in the mouth, at first acrid, numbing to the tongue, and causing a sensible degree of inflammation to the tender surfaces exposed to it, such as the inside of the lips and the upper part of the throat, the inflammatory effects lasting in my own case for many hours, accompanied (after working in the peculiar scent for about an hour) by a sense of dizziness and stupor. The exuded slimy matter appeared to have little effect when repeatedly placed in the mouth of one of the Tritons; but a specimen of *Acilius*, on being placed in water in which some Newts had been soaked for a night, gradually sickened, the limbs waving about when stirred as if powerless, and died in a few hours.

In a more dilute infusion the effects on other water-beetles of the same kind appeared variable and uncertain.

An analysis, made at my request, of the slimy exudation from the cutaneous pores of the Tritons showed its principal elements to be similar in composition to the serum of ordinary blood, and apparently separable from the blood under irritation at the will of the animal.

The enormous number of reptiles which would be required to ascertain the nature of the acrid principle contained in the exudation, throws much difficulty on the elucidation of this particular point; but the analyses, especially to discover the presence of any substance resembling the alkaloids of opium or aconite, showed matter having no alkaloidal character—the acrid and pungent constituent appearing neither acid nor alkaline, but neutral, and also highly volatile. In these characteristics the exudation from the tubercular skin of the Triton corresponds almost exactly with that from the follicles of the skin of the common Toad, as given by Dr. John Davy in his observations published in the *Phil. Trans.*, where the exudation of the Toad is described as a thick yellowish fluid, very acrid, acting on the tongue like extract of aconite, but neither acid nor alkaline.

The effect of the poison when discharged immediately from the

skin of the Tritons upon the subject of experiment appeared usually to be far more powerful than when obtained artificially, and fully to justify the popular prejudice against these creatures. On the Tritons themselves the effect of the poison appeared to be painful and stupifying; in this case the poison could be thoroughly administered by obliging the specimen under experiment to open the mouth sufficiently to allow the tail of another to be repeatedly inserted between the jaws, where it would usually be held so firmly that the bitten one could be raised in the air suspended from the mouth of the biter. The results generally were:—first a small quantity of foam appearing round the jaws whilst attached to the bitten Newt; on being detached, the bitten one did not appear to suffer, but the biter to be in much discomfort, shown in various ways, by dilating the throat-pouches, snapping loudly with the jaws, rubbing the sides of the head as if to get rid of some adhering substance, and in one case by convulsions. The effect gradually passed away; and the circulation of the blood did not appear to be affected by it, save that in all the cases of the biting Newts which I examined, the circulation was rapid and continuous, whilst in about a quarter of the others, whether bitten or in their usual state, it appeared variable, occasionally almost entirely suspended locally, sometimes oscillatory (the blood-globules distinctly moving backwards and forwards) and returning suddenly in rapid continuous or in jerking flow.

On a strong and healthy cat being shown some of the Tritons (although recently well fed, so that he could have no inducement of hunger for attacking them), he immediately seized on them, and after gnawing them in various parts for about a minute dropped them, and was immediately attacked with a discharge of large drops of clear saliva from the mouth, followed by large strings of foam from the corners of the jaws, accompanied by violent and audible action of the jaws, as if to discharge some substance from the mouth.

On the human subject the effect appears much stronger. For the sake of exactly ascertaining the sensations (which in the lower animals could only be judged of by their apparent effects), a part of the back and tail of a live Triton were gently pressed between the teeth sufficiently to alarm the animal and cause it to give out its acrid cutaneous exudation. The first effect was a bitter astringent feel in the mouth, with irritation of the upper part of the throat, numbing of the teeth more immediately holding the rep-

tile, and in about a minute from the first touch of the Newt a strong flow of clear saliva. This was accompanied by much foam and violent spasmodic action, approaching convulsions, but entirely confined to the mouth itself.

The experiment was immediately followed by headache lasting for some hours, general discomfort of the system, and half an hour after by slight shivering fits. It was not intended that any of the poison should be swallowed, but such may have been the case to a slight degree; and none of the remedies (similarly intended merely to be held in the mouth), such as dilute ammonia, had any effect in removing the discomfort, till, about an hour after the experiment, swallowing a few spoonfuls of cream at once allayed much of the local irritation and with it the general discomfort of the system.

These observations appear to show the presence of a principle in the exudation of the Tritons which, whilst to a certain extent painful when applied to external injuries, is sufficiently powerful to cause serious disturbance by its physical effects on such of the sensitive internal surfaces as it may be allowed in ordinary circumstances to reach, and which, if acting with corresponding effect on more important organs, might, if swallowed, be probably dangerous, almost certainly exceedingly painful, in its action on the system.

To the Tritons themselves the exudation appears to act as a protection perfectly adapted to their needs as a defence against such enemies as they have most to fear from in their natural state: the spasmodic effect on the jaws, which would almost immediately ensure the Triton being dropped from the mouth of the attacking animal, joined to the temporary local pain and great discomfort, would (as far as experiment shows) be quite sufficient to distract attention from the reptile till it had time to conceal itself; and the effect as noticed by a casual passer-by would fully justify the common prejudice against the reptile, though harmless and inoffensive in its ordinary state.

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On Diversity of Evolution under one set of External Conditions.

By Rev. JOHN T. GULICK.

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The terms "Natural Selection" and "Survival of the Fittest" present different phases of a law which can act only where there